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*presented by this author -*



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## THE MANAGEMENT OF GLAUCOMA; CHRONIC SIMPLE GLAUCOMA (CHRONIC INTERSTI- TIAL OPHTHALMITIS).\*

BY STEPHEN OLIN RICHEY, M. D.,

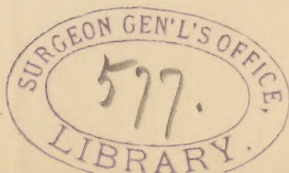
WASHINGTON, D. C.

After the many decades of unsuccessful surgical interference in this class of cases, the above title may excite little interest, as many clinicians of experience are skeptical of good results; a skepticism founded upon the results of surgery. Why should we expect to cure a local expression of a general dyscrasia, by local operative interference, to which nothing is added, because we have labored in the dark, ignorant of the cause and nature of the disease, whose local pathological changes are of low grade, slowly and insidiously progressive? Operation does not modify the cause; it serves only to gain time, in some cases, until such modification can be secured; or, to recover functional integrity, the cause being controlled.

From the date of Graefe's observation that loss of vision in acute glaucoma, was often prevented by iridectomy, this practice has been empirically continued. A symptom, increased intra-ocular tension, has been accepted as the *corpus et spiritus morbi*, and all study and every remedial measure has been addressed to this feature; a mistake which has fostered the practice of iridectomy in simple glaucoma; has substituted for it anterior, or posterior sclerotomy, or stretching of the supra-orbital, or the external nasal nerve. The same untoward fate has attended all forms of operation in this affection; all local means having been tried, it has been a common practice, unpleasant to dwell upon, to desert the case without further effort. Any one of the opera-

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\*Read before the American Ophthalmological Society at New London, July 16, 1896.



tions named may temporarily relieve high intra-ocular tension in one case, and the next case may be worse for it. High intra-ocular tension may be reduced without influence upon the visual power, or the advance of the disease, for the affection progresses in some cases without demonstrable increase of tension.

The above considerations, and many others, but chiefly that in recommending to a glaucomatous person an iridectomy, I could not assure him of a probable outcome, but had to say, "The operation is classical, and is the best measure known to the science," induced me to enter upon a study<sup>1</sup> of the affection, laying aside my acquired views as long ago as 1884. It may be well to state here that I have never seen a case of glaucoma, acute or chronic, that did not have a history of gout, inherited or acquired; or show, sooner or later, the ordinary symptoms or developments of gout, except a few cases caused by syphilis; the cause in such cases being clearly indicated by the history. Further, in my experience, the eye affection may be more satisfactorily managed by the best measures employed in handling gout, than in any other way; provided, always, that the acute form is seen before the loss of visual power is so imminent as to require immediate interference to relieve pressure symptoms. An acute attack of glaucoma may occur, and there may never be another, even if iridectomy be not done.

Whatever details of treatment are adopted, it is possible to lay down certain broad propositions by which, as a guide, the constitutional vice may be influenced. I have never seen acute glaucoma from syphilis, and think it does not occur.

First. When syphilis is the agent of causation, the indications are clear; anti-syphilitic treatment.

Second. Acute or chronic glaucoma of other origin, finds its initial cause and beginning in the digestive tract.

Third. A departure from the normal physiological processes in the digestive tract intoxicates slowly, progressively, and ac-

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<sup>1</sup> To aid the brevity of this communication, reference is made to my papers on this subject, that the interested may follow the course of reaching the conclusion that chronic, simple glaucoma is a chronic interstitial ophthalmitis, generally of gouty origin. They are:

The Prime Etiological Factor of Glaucoma, is Constitutional (Trans. Am. Ophthl. Soc.; Vol. VI, part 2nd, p. 283, 1892.)

The Disease Process, Glaucoma (Am. Jour., Med. Sci., June, 1893.)

The Halo Symptom in Glaucoma (Trans. Am. Ophl. Soc., 1894, and Annals of Ophthy., and Otology, July, 1894).

Chronic Interstitial Ophthalmitis (Chr. Simp. Glaucoma) (Annals of Ophthy. and Otology, July, 1895).



cumulatively, both the vascular<sup>1</sup> and the nervous systems, producing a degrading tissue change in various organs; an interstitial ophthalmitis, an interstitial nephritis, or an interstitial hepatitis; one, or all, of a chronic and progressive character, which may advance slowly or rapidly, or be precipitated into a violently active form by injury, exposure, a more than usually indiscreet meal, or by a severe emotional crisis.

Fourth. That chronic simple glaucoma consists in a hyperplasia of connective tissue, involving ultimately the whole bulb, and cannot be cured by operation.

Fifth. That the acute form is vascular in character, and may be engrafted upon the chronic form in its earlier stages, being thus modified into what is called "irritable" glaucoma.<sup>2</sup>

Sixth. That to meet the indications on this basis, we must begin with the beginning of the disease and correct individual habits, while obviating the danger arising within our special jurisdiction; not simply to operate and neglect further precautions. The application of such precautions require more than special knowledge, as we use the term.

In a paper read before the American Ophthalmological Society in 1892, claiming glaucoma to be gout of the eye, reference was made to the kind influence of clothing, exercise, regulated diet, galvanism, arsenic, lithium, and salicylic acid, in the form of salol, as measures of constitutional importance in chronic glaucoma. In an affection of so much complexity and difficulty, of such great chronicity, and such unreliability in responsiveness to measures which are wholly within the caprices of the patient, it was impossible to be sanguine, even if the results had been better than those usually secured by other means. The added experience and observation of four years have convinced me of the accuracy of the views then advanced, though the means have been somewhat modified by the additional experience, and made more exact, as follows:

As to the local treatment, it is based upon the hypothesis of intra-ocular venous stasis as the cause of increased intra-ocular tension, and consists in the use of a collyrium of eserine, varying in strength from 1-4000 to 1-1000, in one drop doses, repeated as

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<sup>1</sup> By auto-intoxication, the nervous system, through the blood channels, with reaction upon the vascular system, by means of the vaso-motor nerves.

<sup>2</sup> Haemorrhagic glaucoma, is differentiated by vessel coats too rotten to sustain the increased arterial tension. In such cases death usually comes by intra-cranial haemorrhagic effusion from the same cause.

often as is necessary, at short intervals, to contract the pupil, if it is possible for it to do so. If eserine proves irritating, pilocarpine may be substituted. Advancement of the lens and iris, and dilatation of the pupils in glaucoma, are caused by the great fullness of the intra-ocular venous system, and the myotic acts by its effort to empty the veins by pressure from in front. When this turgidness is not reduced the pupil fails to contract, and an increase in the strength of the collyrium only causes violence and danger of iritis, without compensating efficiency. A drop, every ten or twenty minutes, of the strength named maintains safely all the possible influence of the myotic, even if the pupil does not contract. While continuing its use, light taxis of the bulb through the closed lids, over the cornea and ciliary region, if the eyeball is not too tender, with the palmar surface of the two index, or the two index and middle fingers, should be practiced. The pressure should be light and alternating in character. It aids the contractile action of the pupillary muscular fibres, empties the swollen veins of the fundus, and restores the iris and lens to their normal position. The pupillary nerve filaments recover their tone, of which pressure had deprived them; the pupil recovers its size, and tension is reduced.

By this system of taxis, without other mediation, I have reduced tension. In chronic glaucoma, not responding in the slightest degree to eserine, I have found tension lowered, and the pupil contracted, under gentle taxis for ten minutes, even less. When tension has been reduced, the pupil contracted, and the iris replaced, this condition may be maintained by the myotic used with decreasing frequency, aided, if necessary, by daily taxis. The myotic alone has maintained this condition for weeks, used twice a day in the strength of 1-8000, and in chronic glaucoma. If high tension is incorrigible to these measures, the local abstraction of blood by leeches may serve a good purpose, as it did for me once, in a gouty patient with contracting kidneys, who was confined to bed, and had an acute exacerbation of a chronic glaucoma, with severe headache; result, lowered tension, headache relieved, pupils contracted readily to eserine 1 to 8000, which they had refused to do before.

Nothing more than a reference to the effect of topical heat is necessary here, as we are all familiar with it.

The question of constitutional agents is most important; but exercise, clothing, diet, and galvanism, will not be considered, as they require too much time.



Habitual high arterial tension and glaucoma are found associated; though arterial tension exists without glaucoma, the latter seems to depend upon the former, for high arterial tension precedes and co-exists with glaucoma. Hence, the suggestion of the general hot bath ( $105^{\circ}$  to  $108^{\circ}$ ). The habit of over-eating, of eating in excess of the requirements of the system, or beyond the powers of digestion and assimilation, results in the collection in the blood-current of irritating material; the coats of the blood-vessels, especially of the peripheral small vessels, being irritated thereby, contract and resist the passage of the blood-current, thus increasing the action of the heart; the cranial vessels, having the least contractile power, permit an excessive volume of blood to reach this region.

Nitro-glycerine and nitrite of amyl are the two most efficient and prompt drugs within our knowledge for the reduction of arterial tension; alike in their mode of action and in their effect upon the system. Both reduce tension by their influence upon the great vasomotor centre in the medulla oblongata, causing paralysis of this area, with consequent inertia of the vaso-constrictors and dilatation of the blood-vessels, beginning with the nearest, those of the head and neck, producing headache, nausea and languor. An over effect may result in death in this way from paralysis of the muscles of the heart and respiration—the involuntary muscles. Another danger is to be found in idiosyncrasy, as some persons are intoxicated by minute doses. They are incapable of sustained effect, as this depends upon the paralysis of the dominating vaso-motor centre, which can not be continued. Nitro-glycerine (and probably amyl) seems at times to produce toleration of rational dosage; and moreover, both in their mode of action begin at the nerve centre, while the cause of general arterial tension works at the periphery.

A natural and safe agent, capable of sustained effect, is to be found in the hot bath, which dilates the superficial vessels, and contracts the cerebral vessels by indirection; the dilatation of the superficial arterials lowers general arterial tension, lessens the local volume of blood by diversion to the surface, and reduces the whole volume by the transudation of its watery constituents through the skin. It is valuable in the emergency of acute glaucoma, and as a habit in chronic glaucoma. It partly removes the cause, and, like iridectomy in acute glaucoma, it palliates the expression. The cold still bath in glaucoma is suicidal.

Prior to 1892, I had relied upon salol in these cases, under the impression that it offended the stomach less than other sal-

icylates, and because the phenol of the combination is an intestinal antiseptic. A combination of salicylate of sodium, in proper dosage, is as well tolerated and more effective. The salicylates lower the heart's action, but do not at the same time reduce arterial tension; hence their danger.

Ammonia, which is a volatile alkali, and renders any other unnecessary, and is also a solvent of the alleged toxic agent, enters into the combination with salicylate of sodium.

Ammonia is a normal constituent of the blood, helping to maintain its fluidity by holding the fibrin in solution (Bartholow). It increases the temperature of the extremities by lowering arterial tension, relieving the labor and consequent excitability of the heart, and thus promoting the permanency of the effect of the hot bath. It keeps the haemin crystals in solution, and probably leaves the stomach as the less volatile chloride by combination with the gastric hydrochloric acid. Hot pediluvia and muriate of ammonia fomentations are said to have cured senile gangrene. Observation leads me to the opinion that the growing prevalence of lithaemia may be due to the reduced ingestion of ammonia with our food, from which (being volatile) it is probably driven off by the cooking. Every other alkali is wanting in the diffusible, indirect, stimulating effect of ammonia. It renders the salicylate of sodium safer by reducing arterial tension, as the salicylate lowers the action of the heart.

Taraxacum, a mild hepatic stimulant, is the third ingredient.

This combination is an efficient form in which to secure the best effects of all the constituents, and I have seen the peculiar pallor of the gouty and glaucomatous individuals promptly replaced by the health tone, under its influence.

Colchicine:

Colchicum is an old remedy, which has its virtues, and colchicine, the active principle, is the most convenient form in which it can be used. Like every other form of colchicum, it has a marked influence upon the digestive tract, causing diarrhoea, and must be given with caution. It is sedative to the nervous and vascular systems, sometimes increasing, and at other times diminishing, the irritability of the stomach. Acute glaucoma seems to be most susceptible to its influence; at times being promptly aborted by it. In other cases, it seems to be without effect, and so far, I have been unable to distinguish the cases, except by trial. It has most promptly improved the worst cases of serous iritis I have seen, and when they were amenable to nothing else.



Its peculiar action in gout has never been explained satisfactorily, but it seems to be selective in its action, and individual idiosyncrasies exist. I have used it cautiously in doses of gr. 1-100 to gr. 1-50, three or four times a day, guided by the more or less intestinal irritation produced. The chronicity of simple glaucoma limits its usefulness in such cases to the exacerbations.

To recapitulate:

In acute glaucoma, the general hot bath, the use of the myotic with taxis, exhibiting colchicine promptly; repeat the hot bath after several hours, if necessary, always keeping the patient warm after it. The employment of such means, while waiting to determine the necessity for an operation, will often obviate iridectomy. After gaining control of the attack, prophylaxis, as in the management of chronic simple glaucoma. In chronic glaucoma, a bath should never be taken except in hot water, and this should be a resort several times a week. Sponge baths should be interdicted; always tub-baths, immersing the whole body, for the reason given above, and in a warm room. The bath need not be so hot ( $102^{\circ}$  to  $104^{\circ}$ ), nor continued long enough to produce sweating. A weak collyrium of the myotic should be persisted with, aided by daily taxis for a few minutes, until tension is normal, and remains so. At intervals, taxis must be repeated for a few days.

The mixture of salicylate of sodium, ammonia, and taraxacum, should be pushed to the point of the physiological tinnitus, and be continued at this as long as necessary, combatting any symptoms of irritable glaucoma which may arise with colchicine, if it acts well, suspending the mixture while doing so. The intestinal tract must be soaked out with hunyadi janos; this favors intestinal digestion. Three or four ounces of the water should be taken at bed-time, not standing upon the feet afterwards; and this should be repeated every night, perhaps in less quantity, until the stools become yellow. It should be used in this way once a week, or fortnight.

Other indications should be met as they arise, by calomel, gr. 1 in divided doses, for hepatic inaction; tinct. nucis vom., as a stomach tonic; Fowler's solution of arsenic, as a preservative of food in tardy digestion, drop doses at meal time in the soup, or a cup of fluid.

Cases have been under my observation for ten and twelve years in which the halo-symptom has been persistent, the refraction has increased, and the excavation of the disc has steadily

deepened, but there has been little loss of acuteness of vision, and no persistent contraction of the field. The contraction of the field has been always associated with temporary increase of tension, easily reduced.

In acquired glaucoma the outlook is more favorable, and attention to diet, and the method of eating, will probably cure. In case of an inherited tendency, the whole plan of living requires supervision to preserve vision. This is modified to suit the individual case, and is too elaborate for consideration here. Such cases are never cured, I fear.





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